Nova Scotia

Department of
Mines and Energy

Information Series No. 11

Surface Petroleum Shows

Onshore Nova Scotia

compiled by Gayle Short

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HALIFAX, NOVA SCOTIA

COVER PHOTO: Oil Samples from Onshore Nova Scotia.
Samples courtesy of the Nova Scotia Museum,
Halifax, Nova Scotia.

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INTRODUCTION

The purpose of this report is to provide a summary compilation of all available reports and comments made concerning significant surface petroleum shows onshore on Nova Scotia.

Reports of surface shows date back to the middle of the last century (around 1864) when an oil seep was discovered on the western shore of Lake Ainslie, Inverness County. Since that time a number of shows have been discovered in various locations throughout the Province, the majority being found on Cape Breton Island and the northern portion of mainland Nova Scotia.

For purposes of this report, a significant petroleum show includes references to such terms as: oil, natural gas, petroliferous material, methane, bitumen (also bituminous depending on usage of term), pyrobitumen, dead or live oil, hydrocarbon odours or staining, albertite, aphaltic material or tar. Most of these terms are defined in the glossary found in Appendix I of this report.

Surface petroleum shows are of great interest and importance to the petroleum industry. With proper geological interpretation, they may be a direct lead to commercial reservoirs. Residual petroliferous materials are often indications that hydrocarbons have at some time passed through particular rock types, formations or structures. The study of the nature of petroleum shows can help to provide a better understanding of the hydrocarbon trapping potential of an area.

In Nova Scotia all the surface petroleum shows observed to date have been found within Carboniferous age rocks which consist primarily of clastic sediments, precipitates and evaporites. Figure 1 indicates the areas of Nova Scotia underlain by Carboniferous sedimentary rocks.

The information found in this report is, for the most part, quoted directly from the source material. Some general comments have also been added. Complete references for each quote can be found in the reference list at the end of the report.

The shows are numbered and listed in geographical order proceeding generally from west to east. The approximate location of each show can be found on one of the four maps. The index to these maps is supplied in Figure 2. In some cases, a group of petroleum shows has been represented by one symbol for the sake of mapping convenience.

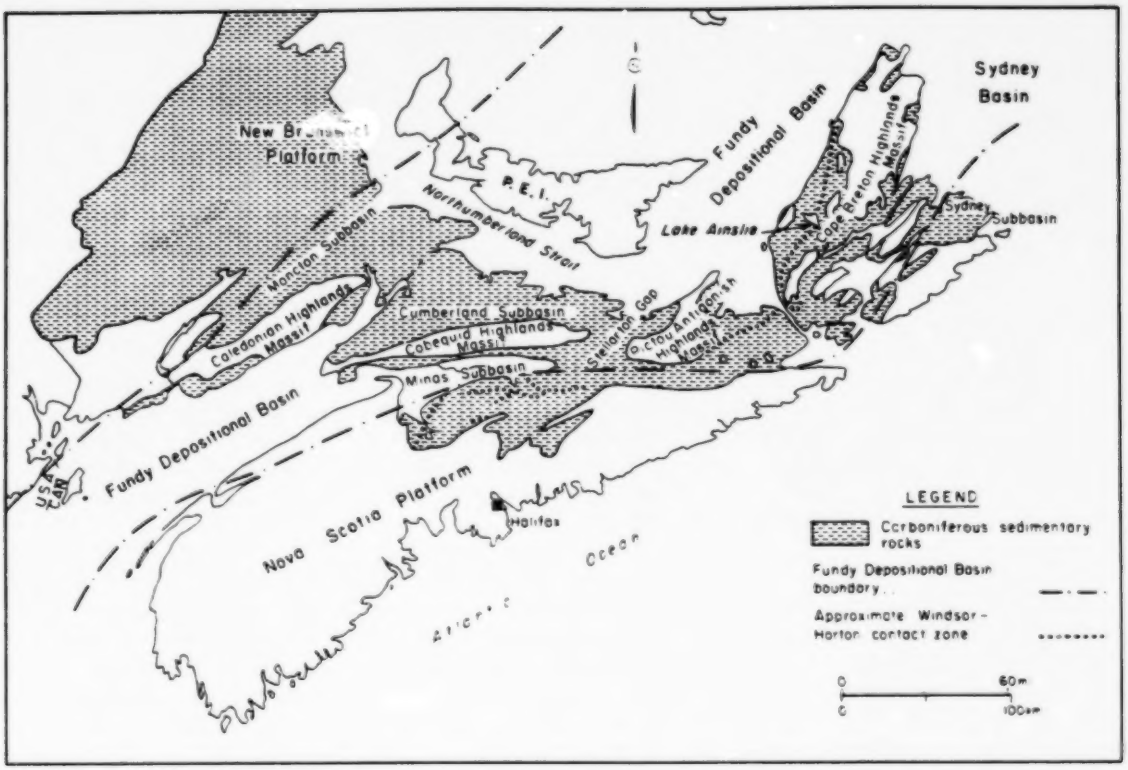

Figure 1. Carboniferous sedimentary rocks of Nova Scotia.

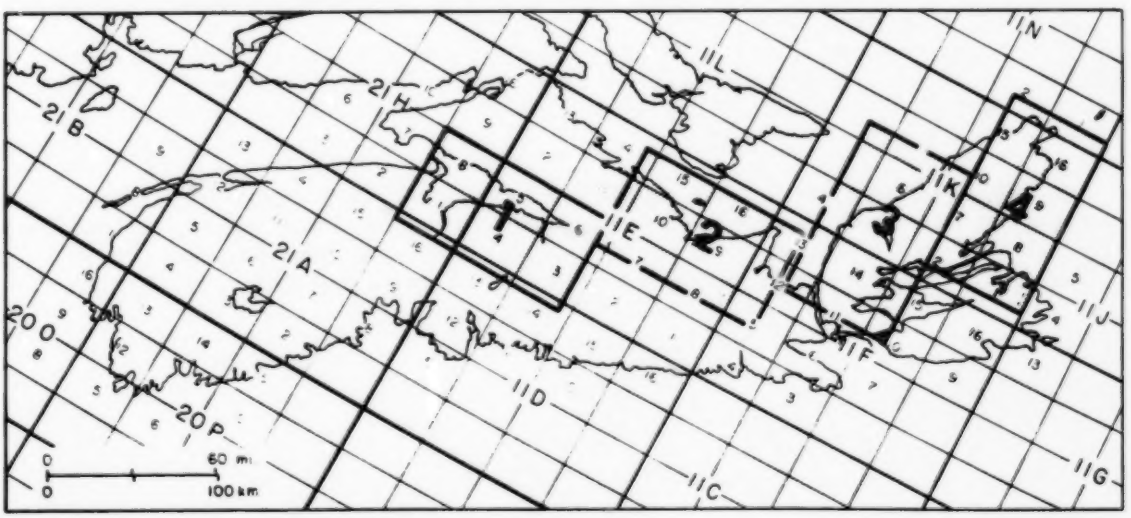

Figure 2. Index to maps included in report.

SUMMARY

OF

SURFACE PETROLEUM SHOWS

SUMMARY OF SURFACE PETROLEUM SHOWS

SHOW	PLACE	ROCK TYPE	AGE	GROUP	FORMATION MEMBER, SUBZONE	TYPE OF SHOW/COMMENTS
S-1	Parrsboro		Carboniferous			iridescent film of oil on water
S-2	Cheverie	Gypsum, Limestone, Anhydrite	Mississippian	Windsor	Macumber and Pembroke Formations	oil and bitumen in cavities, joints and fissures natural gas, petroleum odour, stain
S-3	River John	Sandstone	Pennsylvanian	Riversdale	Basal Boss Point Formation 1000 ft. (304.8 m) above Millsville Formation conglomerate	oil in joint crack
S-4	West Branch River John	Coarse sandstone	Mississippian	Horton	"River John Series"	albertite, along joint planes in coarse sandstone
S-5	New Glasgow	Coal, Clastic sediments	Pennsylvanian	Stellarton		live and dead oil, gas, various shows in area (gas is probably associated with coal gas)
S-6	Big Marsh	Black shales	Mississippian	Upper Horton	Big Marsh Member	black shales with pyrobituminous matter

S-7	Port Hood Island	Gypsum	Mississippian	Basal Windsor		dark, brown-stained gypsum along irregular joint planes
S-8	South of Mabou Harbour	Gypsum	Mississippian	Upper Windsor		heavy, black oil in one inch (2.54 cm) gypsum cavities above C_1 limestone
S-9	Southwest Mabou	Limestone, Gypsum	Mississippian	Basal Windsor		strong odour when broken and small oil-filled cavities in limestone; gypsum stained and has odour when broken
S-10	Northeast Mabou	Sandstone	Mississippian	Upper Horton		coarse grained, porous, dark brown sandstone gives a strong petroliferous odour when broken; just under A_1 limestone
S-11	Glendyer Brook	Dolomite, Limestone	Mississippian	Lower Windsor		oil impregnated, porous, light brown, odiferous dolomite; limestone with strong petroliferous odour and small oil-filled cavities; gypsum with bitumen, strong odour when broken, and dark brown stain along joint planes
S-12	Hillsboro	Sandstone	Mississippian	Lower Windsor		coarse grained, porous, dark brown sandstone common as pebbles where brooks cut the A_1 limestone (as S-10)

SUMMARY OF SURFACE PETROLEUM SHOWS

SHOW	PLACE	ROCK TYPE	AGE	GROUP	FORMATION MEMBER, SUBZONE	TYPE OF SHOW/COMMENTS
S-13	MacIsaac Point	Sandstone	Mississippian	Upper Horton	Strathlorne-Ainslie Formation, Ainslie Member	oil seepages, iridescent sheen on water; just below basal Windsor Group, A_1 limestone
S-14	Mount Young	Sandstone	Mississippian	Upper Horton		petroliferous sandstone
S-15	Loch Ban	Sandstone	Mississippian	Upper Horton	Strathlorne-Ainslie Formation, Ainslie Member	asphalt or bitumen, very dark brown to black sandstone, bands of black stained coarse sandstone, petroliferous odour
S-16	East Lake Ainslie	Barite				asphaltic material in and associated with barite veins (vugs, and intercrystalline spaces). Barite is related to faulting which separates Horton Group from pre-Carboniferous
S-17	MacLean Point	Sandstone	Mississippian	Upper Horton		petroliferous sandstone, film on water
S-18	Little Narrows	Limestone	Mississippian	Windsor		oil in vugs and cracks

S-19	Morrison Lake	Limestone	Mississippian	Upper Windsor	probable Subzone E age	albertite on joint faces or fractures
S-20	Dixon Point	Limestone	Mississippian	Upper Windsor, Canso	Point Edward Formation	petroliferous odour within limestones of the Upper Windsor Group and the Point Edward Formation of the Canso Group
S-21	Kellys Cove	Limestone	Mississippian	Upper Windsor		albertite
S-22	Pleasant Bay	Sandstone	Mississippian	Upper Horton	Strathlorne-Ainslie Formation, Ainslie Member	sandstone impregnated with asphalt or bitumen
S-23	Aspy Bay	Limestone	Mississippian	Lower Windsor	Subzone A (A_2 or Canary limestone)	pyrobitumen contained in voids or vugs
S-24	Bay St. Lawrence	Limestone	Mississippian	Upper Windsor		fetid and/or petroliferous limestone found near the Canso-Windsor Group contact and the faulted Canso-Horton Group contact
S-25	Meat Cove					oil seep

SURFACE PETROLEUM SHOWS

SHOW: S-1

LOCATION: Parrsboro, Cumberland County

MAP: Figure 3

NTS: 21H/08C

"About one mile east of the center of the town along the main highway thence a short distance south from the highway I was shown a narrow depression slightly boggy, at the time of my visit but from which a small stream runs in wet weather. By stirring up the mud it was possible to get an iridescent film of oil on the surface in the pools of water. If this oil film is not of extraneous origin it is possible to have such evidence in the district as the rocks are of carboniferous age, and the structure as checked up by the writer and shown on the attached sketched map indicates a curved anticlinorium, the axis of which probably occurs one mile south of the seepage." (Nova Scotia Department of Mines, 1934, p. 90)

"We were told about an oil seep near Parrsboro, which is perhaps authentic since the inhabitants all seemed to know about it, but, on a visit to the spot, failed to find any indications of oil." (Olsen and Fournier, 1944, p. 66)

SHOW: S-2

LOCATION: Cheverie, Hants County

MAP: Figure 3

NTS: 21H/01D

"Oil and bitumen were first noted about 1872 in the Windsor gypsum that was quarried near Cheverie, and were described by Fletcher (1903) as follows, 'Oil and bitumen have been found in cavities, joints and fissures of a mass of gypsum largely quarried in this neighbourhood ...'." (Crosby, 1962, p. 64)

"Burgess Brothers plaster quarry, Cheverie, Hants Co. -- The presence at this vicinity of oil permeating the gypsum has been known for a number of years ..." (Nova Scotia Department of Mines, 1907, p. 50)

"The principal sedimentary deposits in the area are gypsum-anhydrite. In addition some of the rocks are petroliferous, particularly the Macumber and Pembroke limestone and certain calcareous shales interbedded with the evaporites ... Natural gas occurs in a few springs ... when the Macumber limestone is treated with acid or struck with the hammer it emits a faint odour of petroleum ... When the Pembroke limestone is treated with acid or struck with the hammer it emits a faint odour of petroleum ... The calcareous anhydrite and anhydritic limestone occur in massive and thinly laminated beds that are generally highly folded and contorted. These rocks are petroliferous ... (Boyle, 1972, p. 30, 37-38)

SHOW: S-2 (continued)

"The dark grey and black varieties (of anhydrite) contain much calcite as fine-grained to microcrystalline streaks and patches. The calcite is dense and stained with a brown substance that is presumably petroleum or bitumen." (Boyle, 1972, p. 30, 37-38)

"Oil in small cavities in gypsum of the Windsor group was discovered by quarrying operations at Cheverie, and reported upon by H. Y. Hind about 1872 according to H. Fletcher (1903, p. 393A). Fletcher added that "Oil and bitumen have been found in cavities, joints and fissures of a mass of gypsum largely quarried in this neighbourhood, which overlies a great body of black shales containing numerous remains of plants and animals and thus supply the material for the supposed source from which petroleum originated." (Bell, 1958)

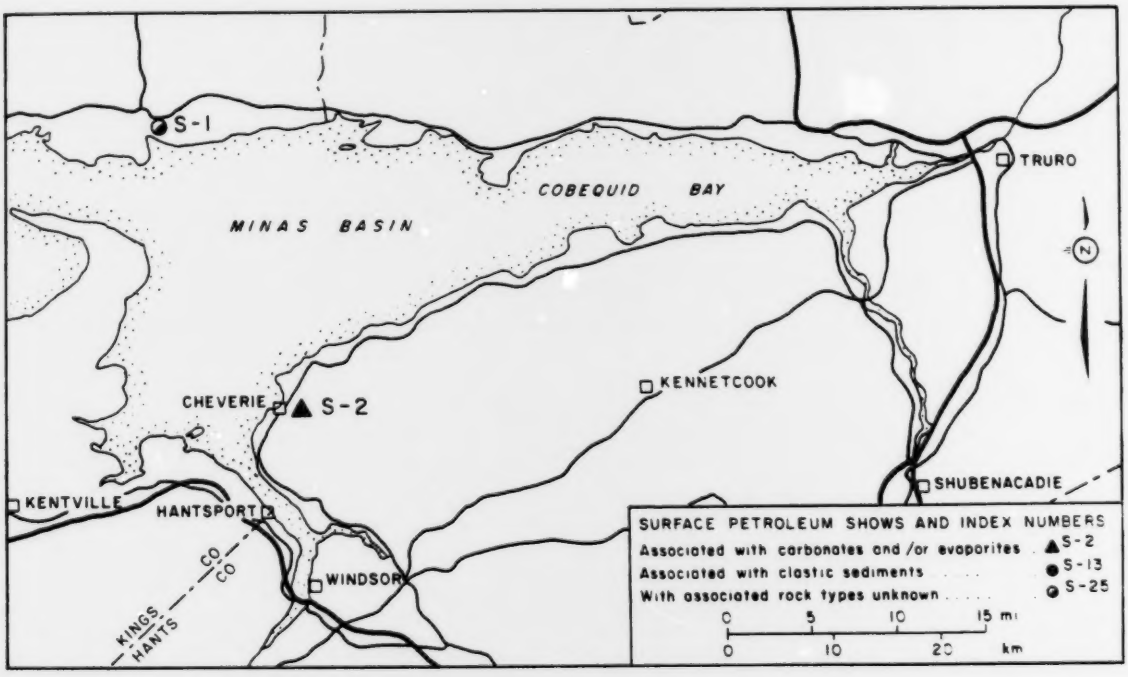

Figure 3. Surface petroleum shows, Map 1, Minas Basin.

SHOW: S-3

LOCATION: River John, Pictou County

MAP: Figure 4

NTS: 11E/11D

"The oil seep found by Roliff last year occurs near the base of the Lismore formation just above the Millsville conglomerate member. The oil occurs in joint cracks of a calcareous concretionary sandstone and appears more like a small pocket than a seepage. The oil is found only where the small creek channel cuts across the bed rock." (Nova Scotia Department of Mines, 1932, p. 39)

"In addition, Roliff found an occurrence of liquid petroleum in a joint crack of a 'calcareous concretionary sandstone' (intraformational limestone conglomerate) in a basal part of the Boss Point formation (Riversdale group) at a horizon about 1,000 feet above the Millsville conglomerate which there forms the basal formation of the Riversdale group and which rests unconformably upon the River John series." (Bell 1958, p. 16)

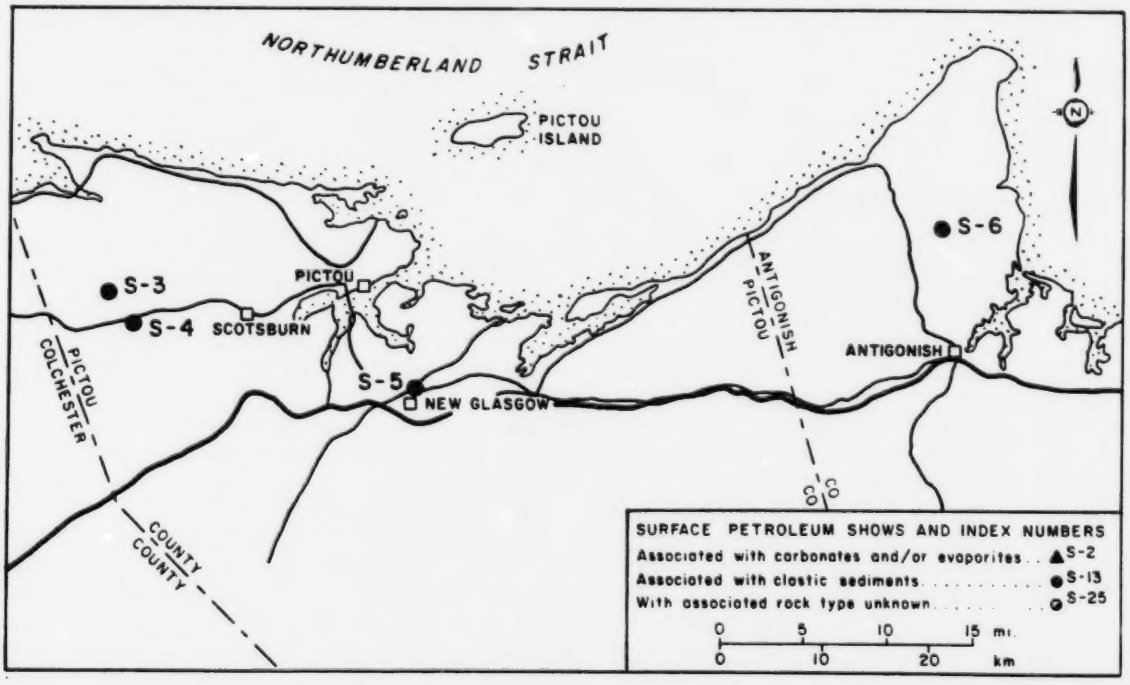

Figure 4. Surface petroleum shows, Map 2, New Glasgow.

SHOW: S-4

LOCATION: West Branch River John, Pictou County

MAP: Figure 4

NTS: 11E/10C and 11E/11D

"Surface occurrences of albertite are not uncommon in the River John series (Horton group) near West Branch River John settlement, for eight localities of such are marked on a geological map of the area prepared by J. S. Stewart and W. A. Roliff (1932), map and page 38." (Bell, 1958, p. 16)

"Albertite (a dessicated petroleum) occurs in minute quantities along jointing planes within coarse sandstones of the River John group. This residue was observed on MacKay Brook, Black River and West Branch River John." (West, 1944, p. 6)

SHOW: S-5

LOCATION: New Glasgow, Pictou County

MAP: Figure 4

NTS: 11E/10A

The following information includes a number of petroleum shows within the New Glasgow-Stellarton area. The gas shows are most probably associated with coal gas.

"One of the earliest published records of surface occurrences of petroleum in the Pictou coalfield was that of M. C. Poole (1895, p. 339) who stated that inspissated drops in some cases plastic, but more often hardened, are found associated with dogtooth spar at the quarry ford of the East River immediately north of the South fault, in the calcaraeous pavement of the George McKay seam, and the limestone (intraformational limestone-conglomerate) of Fraser Ogg's quarry. Blotches of petroleum, weighing a few ounces, have been found associated with calcite or fireclay beds under both the Main and Deep seams. Seepages of gas, apparently of methane derived from the coal seams, were also mentioned by Poole. One instance was connected with the Deep (or Cage) seam. When the Deep seam level was driven it gave off a great deal of gas and cut off the source of supply to the river's bank where previously gas had bubbled up so freely that it would maintain a fire, and had been utilized by women for washing purposes as late as the fifties (op. cit. p. 293). Also, it is known that gas was lit at the surface over a fault beyond the brook (McCulloch or Bear Brook) near the McKenzie pit when explorations were first begun. This also could be done on the interval of the East River over the main seam, and can still be done on McCulloch's Brook a hundred yards below the Stellar slope (op. cit. p. 297)." (Bell, 1958, p. 16)

SHOW: S-5 (continued)

"Gas seeps were seen in a small stream near the Stellarton oil shale outcrops and other gas seeps were reported to us by the farmers in the New Glasgow area." (Olsen and Fournier, 1944, p. 66)

SHOW: S-6

LOCATION: Big Marsh, Antigonish County

MAP: Figure 4

NTS: 11K/12C

"The only member of the Horton group in the Antigonish area that may be considered reasonably to have had potential value for petroleum formation is the Big Marsh member in the upper part of the group. This zone, said to be at least 200 feet thick (H. Howe 1869, p. 35), contains black shales with pyrobituminous matter ... The area containing the Big Marsh shale lies north of that part of the Antigonish Harbour crystalline rock that stood as an upland ridge in Upper Horton time." (Bell, 1958, p. 105)

SHOW: S-7

LOCATION: Port Hood Island, Inverness County

MAP: Figure 5

NTS: 11K/04A

"Mather and Trask (1929, p. 280) ... noted that some of the gypsum in the group was stained dark brown along irregular joint planes, several instances being cited, one on north shore of Port Hood Island, ..." (Bell, 1958, p. 23)

"... the gypsum exposed on the north shore of Smith Island includes several irregular masses of dark oil-stained rock." (Nova Scotia Department of Mines, 1929, p. 294) (Smith Island=Port Hood Island)

SHOW: S-8

LOCATION: South of Mabou Harbour, Inverness County

MAP: Figure 5

NTS: 11K/03B

"W. L. Whitehead (1941 b M.S., p. 8), too, recorded that gypsum above E limestone on the seashore south of Mabou Harbour contains cavities an inch in diameter filled with heavy, black oil. This E limestone is now designated C_1 limestone in the Windsor sequence of the area ..." (Bell, 1958, p. 24)

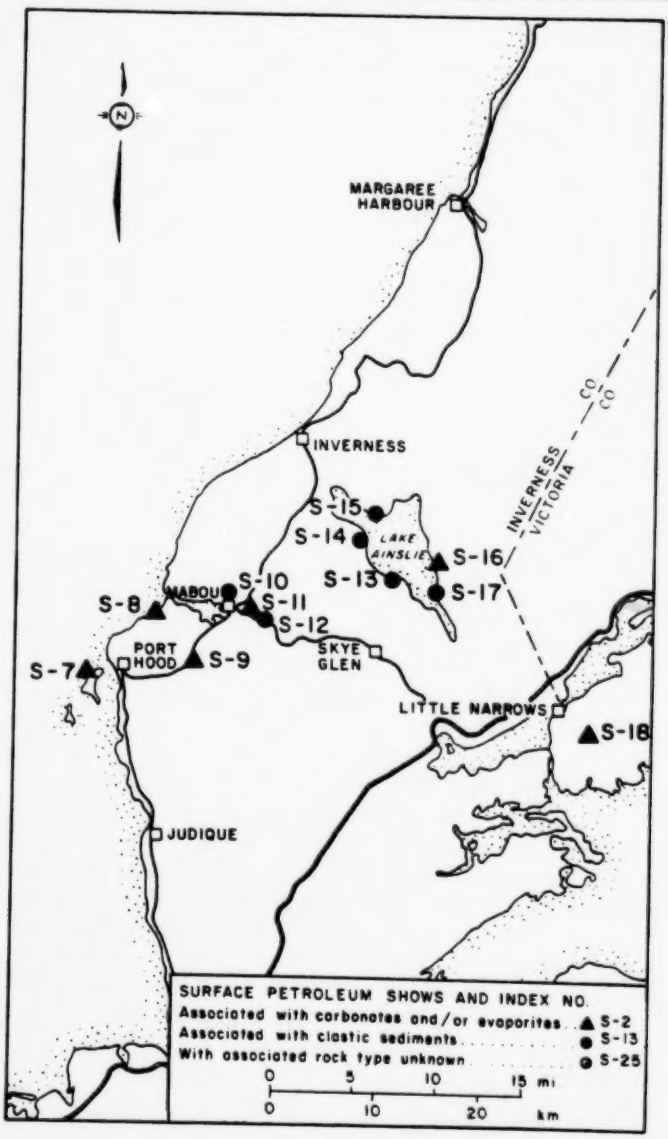

Figure 5. Surface petroleum shows, Map 3, Cape Breton Island (west).

SHOW: S-9

LOCATION: Southwest Mabou, Inverness County

MAP: Figure 5

NTS: 11K/03B

"Mather and Trask (1929, p. 280) in describing the laminated limestone (A_1 limestone) occurring at base of Windsor in the Lake Ainslie area stated that quite commonly it yielded a strong odour of bitumen when broken, and at some localities small cavities, 1/8 of an inch in diameter, were found to be filled with oil ... one on highway 100 yards northeast of bridge at Southwest Mabou ..." (Bell, 1958, p. 23)

"At several localities the gypsum associated with the Black Oolitic and Canary limestones in the Judique Series is impregnated with bituminous material to such an extent that it yields a strong odour of petroleum when freshly broken. Some of the gypsum is stained a dark brownish hue along the sides of the irregular joint planes which run in all directions through the rocks. More commonly the odour of petroleum is yielded by the limestone in the midst of the gypsum or by dark masses which are about half limestone and half gypsum, intimately mixed together. One of the best displays of this sort may be seen along the newly constructed automobile highway, 100 yards northeast from the bridge at Southwest Mabou." (Nova Scotia Department of Mines, 1929, p. 293)

SHOW: S-10

LOCATION: Northeast Mabou, Inverness County

MAP: Figure 5

NTS: 11K/03B

"Outcrops of similar petroliferous sandstone, lying seemingly a short distance below A_1 limestone were reported by W. L. Whitehead (1941 b M.S., p. 8) as occurring elsewhere in the area. He stated that 'coarse-grained, porous, dark brown sandstone giving a strong odour of petroleum when broken lies just under I (now A_1) limestone in creeks branching north from Northeast Mabou River near Northeast Mabou village' and that 'similar sandstone is common in pebbles in the brooks south of Hillsborough where they cut through I (i.e. A_1) limestone'." (Bell, 1958, p. 23)

SHOW: S-11

LOCATION: Glendyer Brook, Inverness County

MAP: Figure 5

NTS: 11K/03B

"Another oil horizon was found in the Windsor in the railroad cut exposures at Glendyr Station. These show at least two oil-impregnated beds of dolomite interbedded with red, green and grey shales and very hard, fractured limestone. The oil-bearing dolomite contrast strongly with the dense and fractured Windsor limestones by its softness and high degree of porosity. It would make a wonderful oil reservoir if encountered in a well. Its color is a light brown and when pulverized smells strongly of gas or oil." (Olsen and Fournier, 1944, p. 65-66)

"Mather and Trask (1929, p. 280) in describing the laminated limestone (A_1 limestone) occurring at base of Windsor in the Lake Ainslie area, stated that 'quite commonly it yielded a strong odour of bitumen when broken and at some localities small cavities, 1/8 of an inch in diameter, were found to be filled with oil' ... at a road forks 1 1/3 miles east of Mabou near mouth of Glendyre Brook." (Bell, 1958, p. 23)

"... gypsum associated with the Black Oolitic and Canary limestones in the Judique Series is impregnated with bituminous material to such an extent that it yields a strong odour of petroleum when freshly broken. Some of the gypsum is stained a dark brownish hue along the sides of the irregular joint planes, which run in all directions through the rocks. More commonly the odour of petroleum is yielded by the limestone in the midst of the gypsum or by dark masses which are about half limestone and half gypsum intimately mixed together ..., along the railroad track at the road forks, one and one-half miles east of Mabou near the mouth of Glendyr Brook." (Nova Scotia Department of Mines, 1929, p. 293-294)

SHOW: S-12

LOCATION: Hillsboro, Inverness County

MAP: Figure 5

NTS: 11K/03B

"Outcrops of similar petroliferous sandstone, lying seemingly a short distance below A_1 limestone were reported by W. L. Whitehead (1941 b M.S., p. 8) as occurring elsewhere in the area. He stated that 'coarse-grained, porous, dark brown sandstone giving a strong odour of petroleum when broken lies just under I (now A_1) limestone in creeks branching north from Northeast Mabou River near Northeast Mabou village' and that 'similar sandstone is common in pebbles in the brooks south of Hillsborough where they cut through I (i.e. A_1) limestone'." (Bell, 1958, p. 23)

SHOW: S-13

LOCATION: MacIsaac Point, Inverness County

MAP: Figure 5

NTS: 11K/03B

MacIsaac Point is the site of the earliest reports of a petroleum show in Nova Scotia.

"Indications of petroleum were observed along the shores of Lake Ainslie, in Inverness County, as far back as 1864." (MacNeil, 1945, p. 6)

"The oil seepages on the shore of Lake Ainslie ... three-fourths of a mile east of McIsaac Point, have long been known. ... At this point the upperbeds of the Ainslie sandstone are exposed along the shore of the lake. A number of small holes have been drilled with crowbars to depths of one to three feet into this sandstone which is here affected by a number of well-defined joint planes, along two or three of which a small amount of vertical movement has probably taken place. Ordinarily these crowbar holes are partly filled with water. If a steel bar or a wooden rod is pounded vigorously in one or more of them, a few drops of heavy, brownish green oil will soon rise to the surface. A thin iridescent sheen is ordinarily to be noticed upon the surface of the water in close proximity to the joint planes. It is reported reliably that a few years ago much larger quantities of oil came to the surface here, but nothing was seen during the summer of 1925 to make certain the fact that more than a few drops of oil are still available in the pores and crevices of the Ainslie sandstone close to the surface at this point." (Nova Scotia Department of Mines, 1929, p. 292-293)

"... the petroliferous sandstone on the west side of the lake was reported at various times in the past to be an active seep ... petroliferous sandstone occurs just below the Horton-Windsor contact." (Kelley, 1958, p. 350)

"All occurrences are in sandstone that lies stratigraphically within several hundred feet beneath basal Windsor limestone (A_1 limestone), and belong to an upper part of the Horton Group, commonly referred to now as the Ainslie formation. Petroliferous sandstone at McIsaac Point lies within 50 feet stratigraphically below this Windsor limestone in axial region of a Lake Ainslie Westside anticline ..." (Bell, 1958, p. 23)

"Slightly petroliferous sand horizons were noted in both limbs of the McIsaac Point anticline, as well as near the anticlinal axis." (Bell, 1927, p. 106C-107C)

"Indications of the presence of petroleum are found on the north and west sides of Lake Ainslie at the contact of the strata of the Windsor and Horton series. The lowest member of the Windsor strata is a grey, finely laminated limestone and it is in contact with massive, brown sandstone at McIsaac Point on the west side of Lake Ainslie. The brown color of this sandstone is due to petroleum residue and the rock when heated over a

SHOW: S-13 (continued)

fire yields hydrocarbon vapors. In the neighbourhood of this point globules of petroleum have been observed rising to the surface of the lake." (Hume, 1932, p. 1985)

SHOW: S-14

LOCATION: Mount Young, Inverness County

MAP: Figure 5

NTS: 11K/03B

"Petroliferous sandstone is confined to the uppermost beds of Upper Horton age, and may be observed ... at certain horizons in the Mount Young shore section ..." (Bell, 1927, p. 106C)

SHOW: S-15

LOCATION: Loch Ban, Inverness County

MAP: Figure 5

NTS: 11K/03D

"At several localities the Ainslie sandstone is richly impregnated with asphalt or bitumen to such an extent that the rock will burn rather vigorously when placed in an ordinary stove fire. At such places the sandstone is very dark brown or even black, as a result of the bituminous matter filling its pores and forming a film around the surface of the sand grains. One such locality was noted on the north shore of Lake Ainslie near Ainslie Point, on the northwest side of the narrow strait separating Loch Ban from the main portion of the lake." (Nova Scotia Department of Mines, 1929, p. 293) [It is assumed that the reference to 'northwest' is a mistake as Ainslie Point is on the northeastern side of this strait.]

"... outcrops of petroliferous sandstone ... occur also on the northern shore of Loch Ban southwest of Ainslie Point." (Bell, 1958, p. 23)

"... north sides of the lake, petroliferous sandstone occurs just below the Horton-Windsor contact." (Kelley, 1958, p. 350)

"... one on the north side of the lake at the point about one-half mile southwest of Ainslie Point post-office ... At Ainslie Point, the oil showing consists of an oil-impregnated, coarse grained, green sandstone which outcrops along the shore for a distance of about 200 feet but in places is covered by slump. The sandstone is stained black by the oil residue in bands varying from one to four feet wide and when freshly broken, a good smell of rich oil is apparent. This oil is apparently of

SHOW: S-15 (continued)

a paraffin base and there are no residues of asphalt." (Olsen and Fournier, 1944, p. 65)

SHOW: S-16

LOCATION: East Lake Ainslie, Inverness County

MAP: Figure 5

NTS: 11K/03A

"Occurrences of asphaltic material may be observed in some of the fissure-veins carrying barite and fluorspar, which occur within rhyolite east of Lake Ainslie. They lie near a fault that has brought rhyolite against strata of the Horton group at Trout River and against basal Windsor strata at Cobb Brook." (Bell, 1958, p. 24)

"On the east side of the lake, a condensed petroleum product occurs with a barite-fluorite-calcite vein. The vein was intruded along a high-angle reverse fault that separates Horton strata from pre-Carboniferous strata along the west side of the southernmost pre-Carboniferous upland." (Kelley, 1958, p. 350)

"The existence of surface indications of petroleum in Lake Ainslie district is readily verifiable ... (a) petroleum impregnations of sandstones; (b) presence of an inspissated product of petroleum in a barite vein near Lake Ainslie East side ... The locality of the petroliferous barite vein is about one mile south of Lake Ainslie East Side settlement ... The petroleum product is in the nature of a black mineral tar, readily fusible and inflammable, that occupies spaces between the barite crystals ..." (Bell, 1927, p. 106C-107C)

SHOW: S-17

LOCATION: MacLean Point, Inverness County

MAP: Figure 5

NTS: 11K/03A

"Petroliferous sandstone is confined to the uppermost beds of Upper Horton age, and may be observed ... near McLean Point on the north shore. The strongest impregnation noted was at the latter locality ... At McLean Point the dips are all eastwardly and the dominant structural feature is a fault situated a short distance north of the observed petroliferous rock. At times of high-water level of the lake, films of petroleum have been reported as occurring on the water, and there would seem to be little doubt of the validity of these observations as the petroliferous sandstone in places might be a source of oil seepage." (Bell, 1927, p. 106C-107C)

SHOW: S-17 (continued)

NOTE: In this report the reference to McLean Point on the north shore is contradictory, as the only McLean Point in the area is on the east shore of Lake Ainslie. The show is therefore plotted on the eastern side, but there is a possibility that this report is in reference to the Loch Ban shows (S-15) on the north shore.

SHOW: S-18

LOCATION: Little Narrows, Victoria County

MAP: Figure 5

NTS: 11F/15C

"An outcrop of limestone near the second hole, believed to belong to the same limestone bed occurring at the top of strata cut by the drill at both locations, was seen to contain vugs of oil." (Bell, 1958, p. 133)

"D. J. MacNeil (147 C, MS., p. 4) recorded his finding of a Windsor limestone, lying beneath gypsum in the Little Narrows area, which contained cracks and vugs filled with oil." (Bell, 1958, p. 24)

SHOW: S-19

LOCATION: Morrison Lake, Cape Breton County

MAP: Figure 6

NTS: 11K/01C

"In 1930 the writer observed what he then considered to be albertite in a few limestones of the Sydney coalfield. The main occurrence was on joint faces or fractures in a dark grey, crinoidal, bituminous and partly algal limestone of probable subzone E age, which outcrops in a brook, about 1,300 feet downstream from a road bridge that crosses brook about one mile northeast of Morrison Lake (Geological Survey of Canada Map 360A)." (Bell, 1958, p. 25)

NOTE: There are two Morrison Lakes in the area covered by Geological Survey of Canada Map 306A. It is assumed that the reference was made to the more northerly of the two.

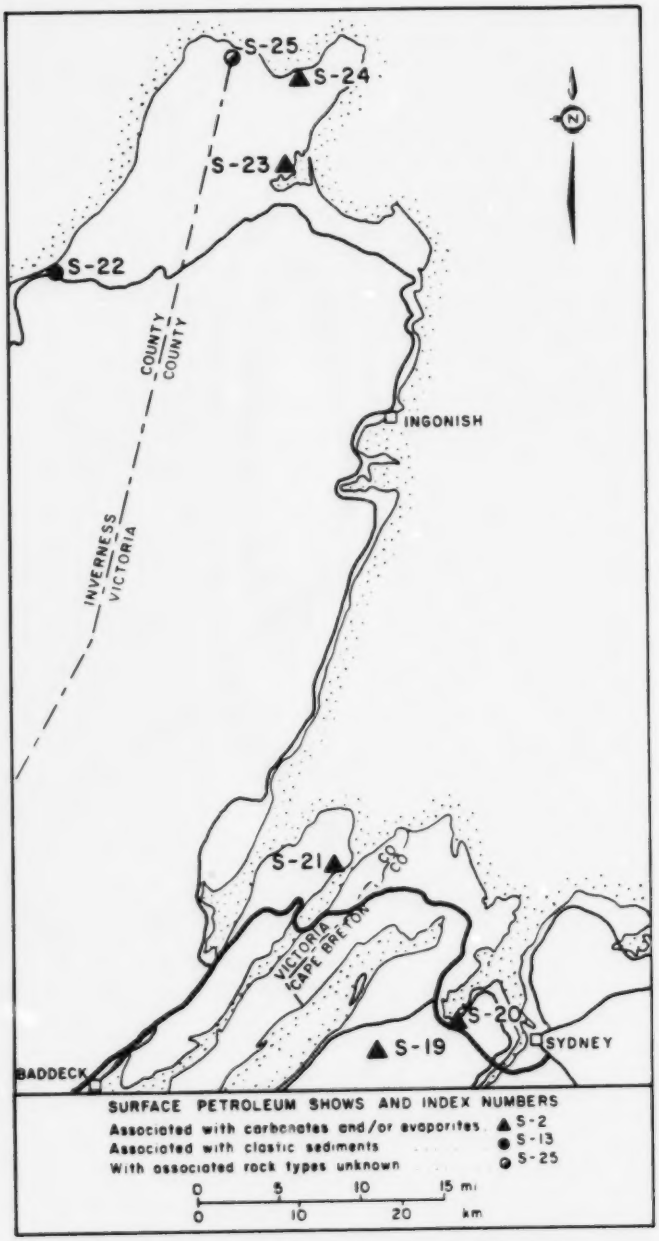

Figure 6. Surface petroleum shows, Map 4, Cape Breton Island (east).

SHOW: S-20

LOCATION: Dixon Point, Cape Breton County

MAP: Figure 6

NTS: 11K/01C and 11K/01D

A detailed study was done of the "beds along the shores of the Pt. Edward Peninsula between the two arms of Sydney Harbour."

Examined in particular were the "rocks of the Upper Windsor series, exposed along northeast side of Pt. Edward Peninsula, from Dixon Point southwestward to the mouth of Grantmire Brook and thence up the valley of that stream to a point 1,200 feet south of the Route 5 highway bridge".

Some of the limestone exposed in this section gave off a petroliferous odour. A strong petroliferous odour was also given off by a one foot section of black limestone located in the "rocks of the Point Edward Formation exposed along the northwest side of Pt. Edward Peninsula from Edward Point southwestward toward Dixon Point." (Mather, 1944, p. 16-18, 29)

SHOW: S-21

LOCATION: Kellys Cove, Victoria County

MAP: Figure 6

NTS: 11K/08B

"In 1930 the writer observed what he then considered to be albertite in a few limestones ... Another occurrence, also in Upper Windsor limestone, was seen in an outcrop of limestone about 450 feet north-east of bridge on Englishtown road at Kelley Cove (Geological Survey of Canada Map 359A)." (Bell, 1958, p. 25)

SHOW: S-22

LOCATION: Pleasant Bay, Inverness County

MAP: Figure 6

NTS: 11K/15B

"At several localities the Ainslie sandstone is richly impregnated with asphalt or bitumen to such an extent that the rock will burn rather vigorously when placed in an ordinary stove fire. At such places the sandstone is very dark brown or even black, as a result of the bituminous matter filling its pores and forming a film around the surface of the same grains ... Similar sandstones impregnated with asphalt are reported to occur along the northwest shore of Cape Breton Island in the general vicinity of Pleasant Bay ..." (Nova Scotia Department of Mines, 1929, p. 293)

SHOW: S-23

LOCATION: Aspy Bay, Victoria County

MAP: Figure 6

NTS: 11K/16C

"Only a single outcrop of the stratigraphically higher A_2 (Canary) limestone is known. It outcrops north of the islands in North Pond, between the shore and the Aspy fault line scarp. It is a brownish grey rock with a vuggy appearance, possibly due to weathering out of silt pebbles (Sage, 1954), and distinctive yellow buff weathered surfaces. The voids or vugs commonly contain pyrobitumen." (Neale and Kelley, 1960, p. 86)

SHOW: S-24

LOCATION: Bay St. Lawrence, Victoria County

MAP: Figure 6

NTS: 11K/16C

"A few thin beds of vuggy, slightly petroliferous limestone outcrop near the fault zone that separates Horton Group fron Canso Group rocks ... Windsor rocks ... in the area belong largely if not wholly to the upper part of the Windsor Group. They consist of grey limestone and limy siltstone with a small amount of interbedded, coarse, pale brown conglomerate in the south-eastern part of the outcrop area. The limestones are generally fetid and/or petroliferous". (Neale, 1964)

"In the McDougall Pond region ... the limestone is commonly oolitic and fetid or petroliferous." (Neale, 1963)

"The Canso-Windsor contact is ... also exposed about 3,000 feet from the fault zone where slightly petroliferous, Windsor grey limestone, brown sandstone, and limestone breccia is overlain by Canso limy grey shale ..." (Neale and Kelley, 1960, p. 88)

SHOW: S-25

LOCATION: Meat Cove, Inverness County

MAP: Figure 6

NTS: 11N/02A

"There are oil seeps along the shores of Lake Ainslie, 46 miles west of Sydney, and in Meat Cove, near Cape North, 63 miles northwest of Sydney." (Mather, 1944, p. 6)

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APPENDIX I

GLOSSARY OF PETROLEUM TERMS

GLOSSARY OF PETROLEUM TERMS

(from: Rice, 1963; Leecraft, 1983; Whitehead, 1983)

Albertite — a black variety of bitumen with a brilliant lustre and conchoidal fracture. It is practically insoluble in alcohol and only partially so in turpentine.

Asphalt — a black, glossy, and sometimes brittle variety of bitumen. Some asphalts are just pourable under normal conditions, whereas others are virtually solid. Usually dark brown or black in colour, melts at 90° to 100°F, and is to a large extent soluble in oil of turpentine, ether or alcohol. Occurs as seeps, springs, lakes and impregnations in rocks. The most noted occurrences are the Trinidad Pitch Lake and the Athabasca Tar Sands.

Bitumen — generic name of a variety of hydrocarbons, all of which are dark, heavy (SG 100 to 110), viscous to solid, and go by the names of asphalt, asphaltic, tar and pitch. Bitumen, an ancient name describing early discoveries of oil seepages, has come to mean a pigment derived from asphalt. However, nomenclature is difficult to apply since bitumen, tar, pitch and asphalt have different meanings all over the world. One tonne of bitumen yields between 5.8 and 6.4 barrels of oil.

Bituminous — 1. containing much organic, or at least carbonaceous matter, mostly in the form of the tarry hydrocarbons which are usually described as bitumen.

2. having the odour of bitumen. Often applied to minerals.

Dead Oil — oil containing no dissolved gas, and therefore devoid of any built-in drive mechanism, as opposed to wild or live oil. Distilled from tar, it is heavier than water.

Hydrocarbons — compounds of the elements hydrogen and carbon, in either solid, liquid or gaseous form. Natural gas and petroleum are mixtures of hydrocarbons.

Hydrocarbon Minerals — a term usually taken to mean the naturally occurring solid varieties of carbon-hydrogen (sometimes also oxygen) compounds, i.e. the natural 'organic' minerals.

Live Oil — oil containing dissolved gas. Also known as unstabilized oil. It is lighter than water.

Methane — a light, gaseous, inflammable paraffin hydrocarbon, CH_4, that has a boiling point of -258°F and is the chief component of natural gas and an important basic hydrocarbon for petrochemical manufacture.

Natural Gas — a mixture of hydrocarbons which occur naturally in gaseous form at normal temperatures and pressures, but which may be found as liquids under suitable temperature and pressure conditions. Natural gas is mainly paraffinic consisting mostly of methane with significant proportions of ethane, propane, and butane, and also some pentane and higher boiling point compounds. Besides hydrocarbon gases, natural gas may contain appreciable quantities of nitrogen, helium, carbon dioxide, hydrogen sulphide and water vapour.

Oil — the common term for liquid petroleum as found in nature. It is lighter than water, insoluble in water, and inflammable. A mixture of natural hydrocarbons.

Oil Shale — highly organic shale which is capable of yielding, upon proper retorting, liquid hydrocarbons of the general nature of petroleum.

Petroleum — a substance occurring naturally in the earth and composed mainly of mixtures of chemical compounds of carbon and hydrogen, with or without other nonmetallic elements such as sulphur, oxygen, and nitrogen. The compounds that compose it may be in the gaseous, liquid or solid state.

Petroliferous — containing or yielding petroleum.

Pyrobitumen — a dark-coloured, solid, infusible, natural-hydrocarbon complex, often associated with a mineral matrix, insoluble in water, and relatively insoluble in carbon disulphide, benzol, etc.

Tar — a dark, viscous, asphaltic residue resulting from partial evaporation or distillation of petroleum or other hydrocarbons of asphaltic base.